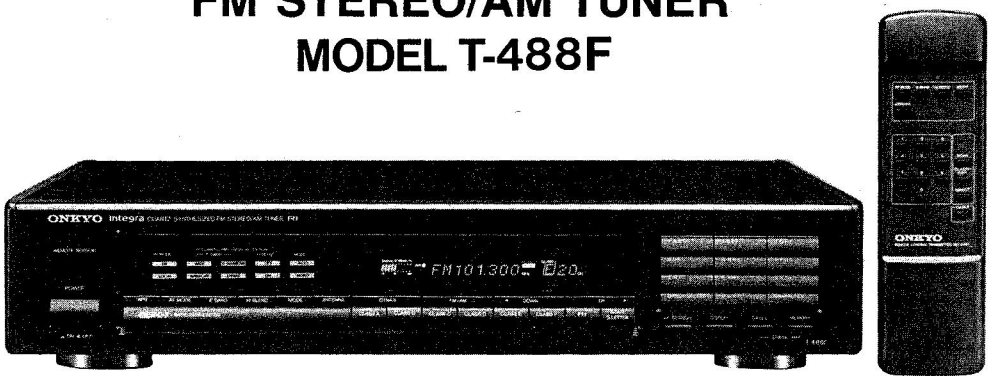
T-488F

Ref. No.3441

ONKYO SERVICE MANUAL

SYNTHESIZED
FM STEREO/AM TUNER
MODEL T-488F



Black and Silver models

BHUP,BHUPF,UP,UPF	230V AC,50/60Hz

SAFETY-RELATED COMPONENT WARNING!!
COMPONENTS IDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

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ONKYO
AUDIO COMPONENTS

SPECIFICATIONS

FM

Tuning Range:	87.50 — 108.00MHz (50/25kHz steps)	
Usable Sensitivity:	Mono:	10.3dBf, 0.9μV, 75 Ohms IHF 0.8μV 75 Ohms DIN
	Stereo:	17.2dBf 2.0μV, 75 Ohms IHF 20μV 75 Ohms DIN
50dB Quieting Sensitivity:	Mono:	16.1dBf 1.7μV 75 Ohms
	Stereo:	36.1dBf 17μV 75 Ohms
Capture Ratio:	1.3dB	
Image Rejection Ratio:	100dB	
IF Rejection Ratio:	100dB	
Signal-to-Noise Ratio:	Mono:	85dB IHF
	Stereo:	77dB IHF
Selectivity:	70dB DIN (± 300kHz, 40kHz dev. Super Narrow)	
AM Suppression Ratio:	55dB	
Total Harmonic Distortion:	Mono:	0.03% (Wide)
	Stereo:	0.07% (Wide)
Frequency Response:	30 — 15,000Hz (+0.5, −1.0dB)	
Stereo Separation:	45dB at 1kHz (Wide) 33dB at 70 — 10,000Hz (Wide)	
Output Voltage:	0.75V	
Muting Level:	17.2dBf 2.0μV, 75 Ohms	

AM:

Tuning Range:	522 — 1611kHz (9kHz steps)
Usable Sensitivity:	25μV
Image Rejection Ratio:	40dB
IF Rejection Ratio:	40dB
Signal-to-Noise Ratio:	40dB
Total Harmonic Distortion:	0.7%
Output Voltage:	150mV

General

Power Supply:	AC 230V, 50Hz
Dimensions (W x H x D):	455 x 90 x 360 mm
Weight:	5.2 kg, 11.5 lbs.

Specifications and features are subject to change without notice.

SERVICE PROCEDURES

1. Safety-check out

After correcting the original service problem, perform the following safety check before releasing the set to the customer.

Connect the insulating-resistance tester between the plug of power supply cord and chassis.

Specifications: More than 10MΩ at 500V.

2. Memory preservation

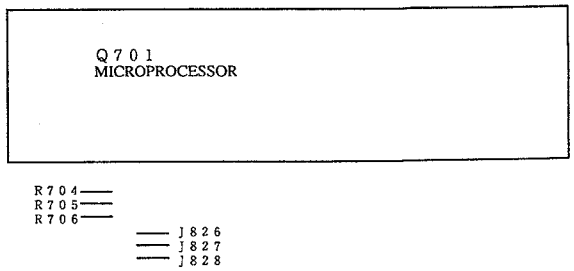
This unit does not require memory preservation batteries. A built-in memory power back-up system preserves contents of the memory during power failures and even when the unit is unplugged. The unit must be plugged in and the power switch turned on and off once in order to change the back-up system. Note that since this is not a permanent memory, the power switch must be turned on and off a few times each month to keep the back-up system operative. The period of time during which memory contents are preserved after power has last been turned off varies depending on climate and placement of the unit.

On the average, memory contents are protected over a period of 3 to 4 weeks (a minimum of 2 weeks) after the last time power has been turned off. This period is shorter when the unit is exposed to very high humidity or used in an area with an extremely humid climate.

3. Changing the AM band step

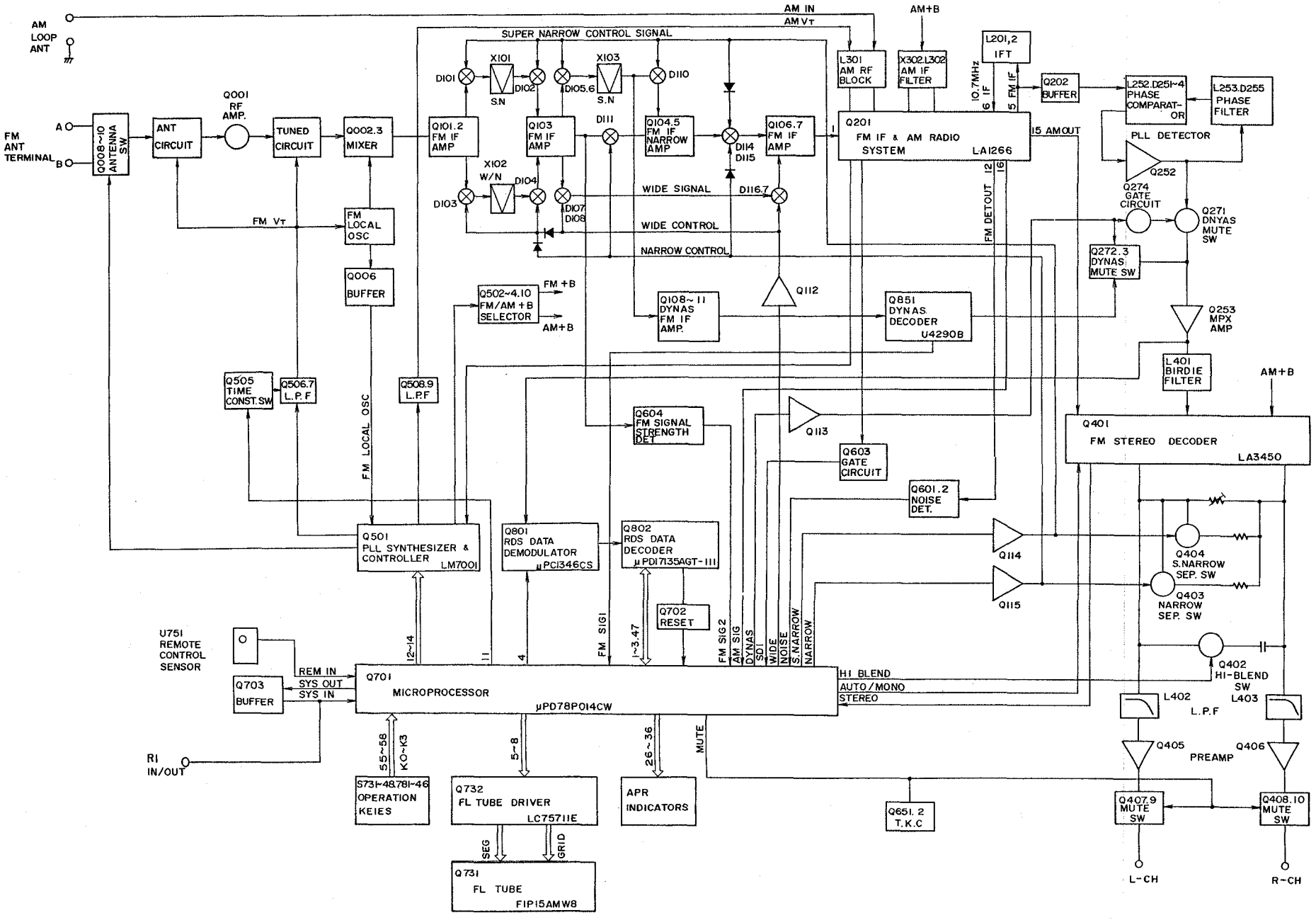
When change the band step, refer the table as shown below.

Band Step	J826
10kHz → 9kHz	Short
9kHz → 10kHz	Cut

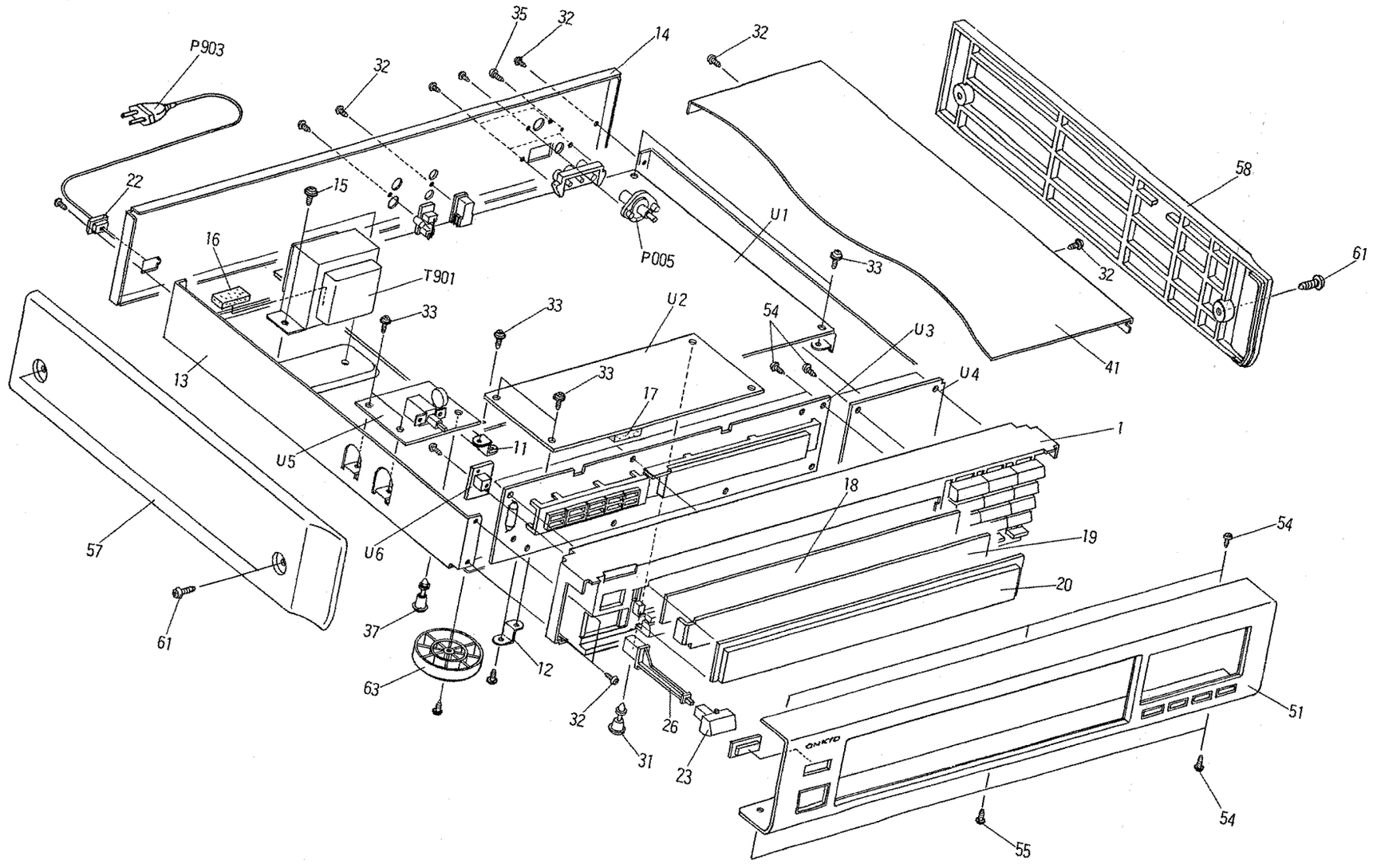


DIGITAL CIRCUIT PC BOARD

BLOCK DIAGRAM



EXPLODED VIEW



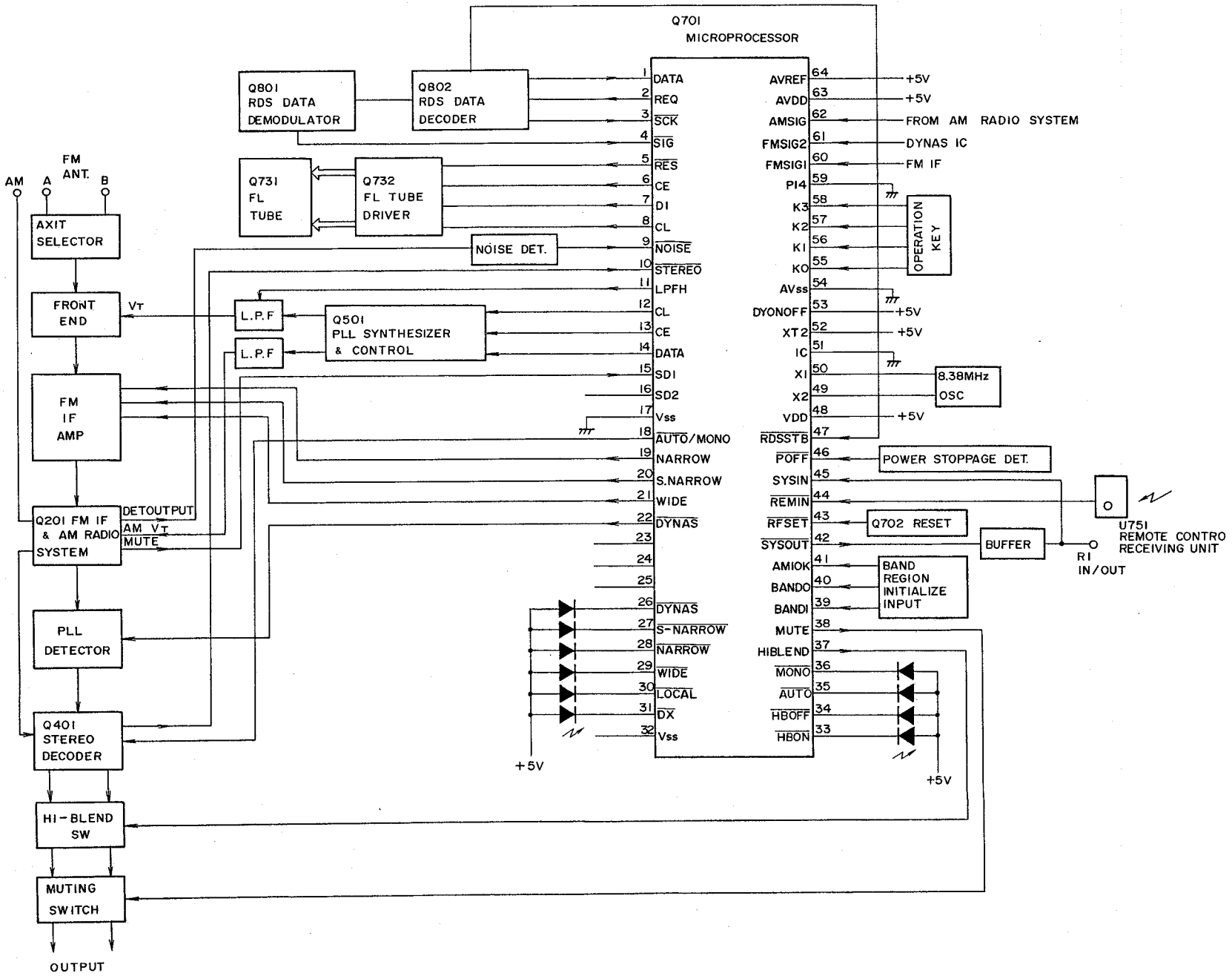
PARTS LIST

REF NO.	PART NO.	DESCRIPTION
1	27110744	Front bracket ass'y <B>
	27110745	Front bracket ass'y <S>
11	27141577	Bracket PC
12	27141579	Bracket S
13	27100241A	Chassis
14	27121668	Back panel
15	830440069	4TTC+6C(BC),Self-tapping screw
16	28140881	14×50×15,Cushion
17	28141254	14×25×15,Cushion
18	28133289	Back plate
19	28130262	Dial plate
20	28191598	Clear plate
22	27300750	⚠ Bushing,cord
23	28324397	Knob,power <B>
23	28324398	Knob,power <S>
26	27273069A	Joint,power
28	260215	Binder
31	27190524	KGLS-14R,Holder
32	834430088	3TTS+8B(BC),Self-tapping screw
33	831130088	3TTW+8B,Self-tapping screw
35	834230168	3TTS+16B(Ni),Self-tapping screw
37	27190511	KGLS-16R,Holder
41	28184490B	Top cover
51	1A404701K	Front panel ass'y <B>
51	1A406701K	Front panel ass'y <S>
54	833430080	3TTP+8P(BC),Self-tapping screw
55	801230	3STS+8BQ(BC),Self-tapping screw
57	28185369	Side panel L
58	28185370	Side panel R
61	837440169	4TTC+16C(BC),Self-tapping screw
63	27175254	Leg
P005	25045156	KE31-0006,Antenna socket
P903	253149	⚠ AS-CEE,Power supply cord
T901	2300865A	⚠ NPT-1158P,Power transformer
U1	1A404501-1	NARF-4601-1,Main circuit pc board ass'y
U2	1A404505-1	NADG-4605-1,Digital circuit pc board ass'y
U3	1A404506-1	NADIS-4606-1,Display circuit pc board ass'y
U4	1A404507-1	NASW-4607-1,Operation switch pc board ass'y
U5	1A404508-1	NAPS-4608-1,Power switch pc board ass'y
U6	1A404509-1	NAETC-4609-1,Remote control sensor pc board ass'y

NOTE: <B>:Black Model only
<S>:Silver Model only

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

MICROPROCESSOR CONNECTION DIAGRAM

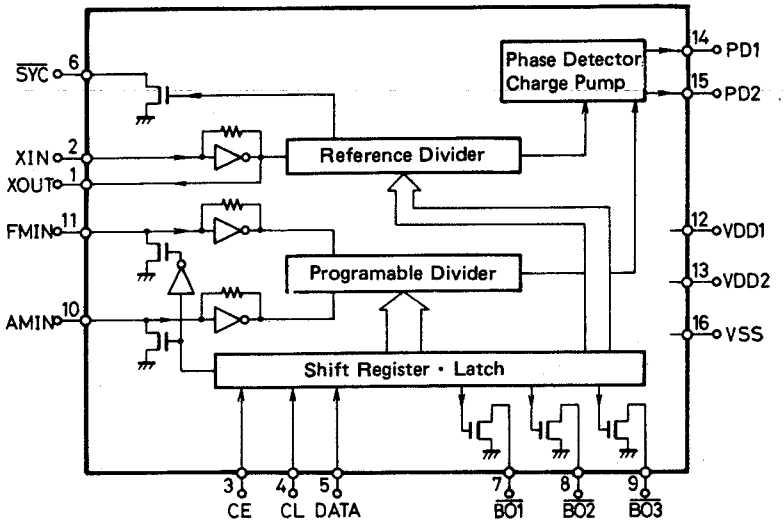


TERMINAL DISCRIPTIONS

No.	Terminal	I/O	Description	No.	Terminal	I/O	Description
1	RDSDATA	I	Connect to the terminal DATA of RDS decoder μPD17135AGT-111	34	HBOFF	O	HI-BLEND OFF indication output
2	RDSREQ	O	Connect to the terminal REQ of RDS decoder μPD17135AGT-111	35	AUTO	O	AUTO indication output
3	RDSSCK	I	Connect to the terminal SCK of RDS decoder μPD17135AGT-111	36	MONO	O	MONO indication output
4	RDSSIG	I	RDS broadcast detection terminal.L when RDS broadcast.	37	HIBLEND	O	Hi-blend control output
5	FIPRES	O	Connect to the terminal RES of FL tube driver IC LC75711E	38	MUTE	O	Muting control output
6	FIPCE	O	Connect to the terminal CE of FL tube driver IC LC75711E	39	BAND1	I	Initializing for the region switching of FM band range
7	FIPDI	O	Connect to the terminal DI of FL tube driver IC LC75711E	40	BAND0	I	Initializing input for the region switching of FM band range
8	FIPCL	O	Connect to the terminal CL of FL tube driver IC LC75711E	41	AM10K	I	Initializing input for the region switching of AM band range
9	NOISE	I	Noise detection input. L when the broadcast receives the disturbance	42	SYSOUT	O	System code input
10	STEREO	I	Stereo broadcast detection input. L when the stereo broadcast.	43	RESET	I	System reset input
11	LPFH	O	Time constant switching output of low pass filter	44	REMIN	I	Remote control transmitter signal input
12	PLLCL	O	Connect to the terminal CL of PLL IC LM7001.	45	SYSIN	I	System code input terminal
13	PLLCE	O	Connect to the terminal CE of PLL IC LM7001.	46	POFF	I	Detection input for stoppage of electric current
14	PLLDATA	O	Connect to the terminal DATA of PLL IC LM7001.	47	RDSSTB	I	Connect to the terminal STB of RDS decoder
15	SD1	I	Broadcast detection input when DYNAS is off.	48	VDD		Supply voltage (5V)
17	VSS		Ground	49	X2	O	Crystal connection terminal for main system clock oscillation
18	AUTO/MONO	O	AUTO/MONO switching output. H when MONO.	50	X1	I	Crystal connection terminal for main system clock oscillation
19	NARROW	O	IF band control output. H when NARROW.	51	IC		Internal connection terminal
20	S.NARROW	O	IF band control output. H when S.NARROW.	52	XT2		Crystal connection terminal for sub system clock oscillation
21	WIDE	O	IF band control output. H when WIDE.	53	DYNASDIS	I	Initializing input for DYNAS operation switching
22	DYNAS	O	DYNAS control output. L when DYNAS.	54	AVSS		Ground terminal for A/D converter
26	DYNAS/APR	O	DYNAS indication output (DYNASDIS=0)	55	K0	I	Operation key connection terminal
			APR indication output (DYNASDIS=1)	56	K1	I	Operation key connection terminal
27	S.NARROW	O	SUPER NARROW indication output	57	K2	I	Operation key connection terminal
28	NARROW	O	NARROW indication output	58	K3	I	Operation key connection terminal
29	WIDE	O	WIDE indication output	60	FMSIG1	I	Signal level 1 signal of FM
30	LOCAL	O	LOCAL indication output	61	FMSIG2	I	Signal level signal 2 of FM
31	DX	O	DX indication output	62	AMSIG	I	Signal level of AM
32	VSS		Ground	63	AVDD		Supply voltage (+5V) for A/D converter
33	HBON	O	HI-BLEND ON indication output	64	AVREF	I	Reference voltage input for A/D converter

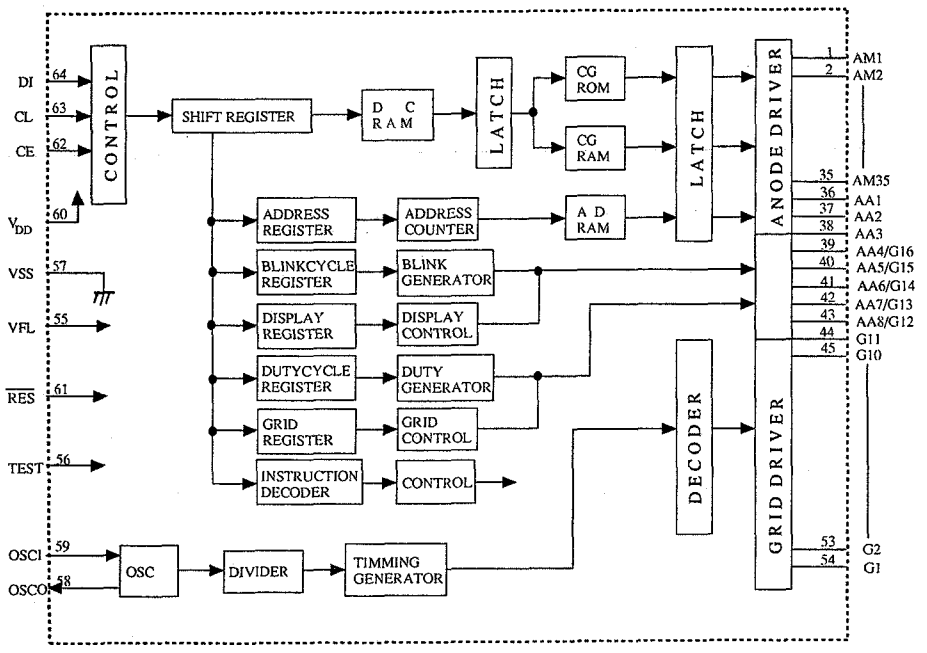
IC BLOCK DIAGRAM AND DESCRIPTIONS

LM7001 (PLL Synchsizer and Control)

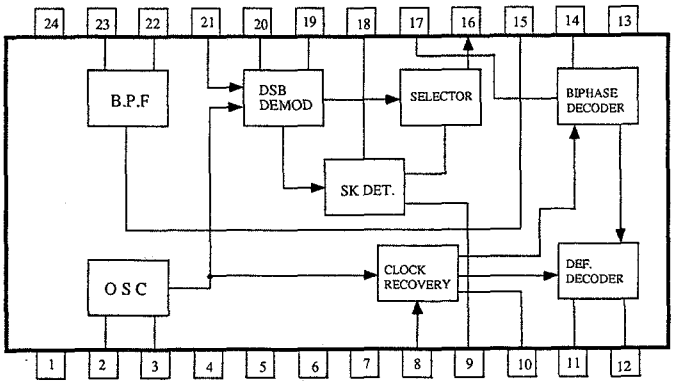


Pin No.	Terminal	Description
1	XOUT	Connect to the 7.2 MHz crystal oscillator.
2	XIN	
3	CE	Chip enable terminal. Connect to the PLL terminal of microprocessor.
4	CL	Serial clock input terminal. Connect to the CLOCK terminal of microprocessor.
5	DATA	Serial data input terminal. Connect to the DATA terminal of microprocessor.
6	SYN	Not used.
7	ANT $\overline{A}$/B	Antenna selector output terminal. "L" when Antenna A.
8	$\overline{\text{LOCAL}}$/DX	This is the output terminal forRF mode. "H" when DX.
9	FM/$\overline{\text{AM}}$	This is the output terminal for band FM/AM. "L" when AM.
10	AMIN	AM local oscillator input terminal.
11	FMIN	FM local oscillator terminal.
12	VDD 1	Power supply terminal for back-up.
13	VDD 2	Power supply terminal.
14	PD1	Charge pump output of the phase detector which constitutes the PLL. High level is output when the divided local oscillator frequency is high than the reference frequency. In the opposite case, low level is output. Floating occurs when the frequencies matched. The output is applied to the variable capacitor diode in the local oscillator through the low pass filters.
15	PD2	
16	Vss	Ground terminal.

LC75711E (FL Tube Driver)



μPC1346CS (RDS Decoder)



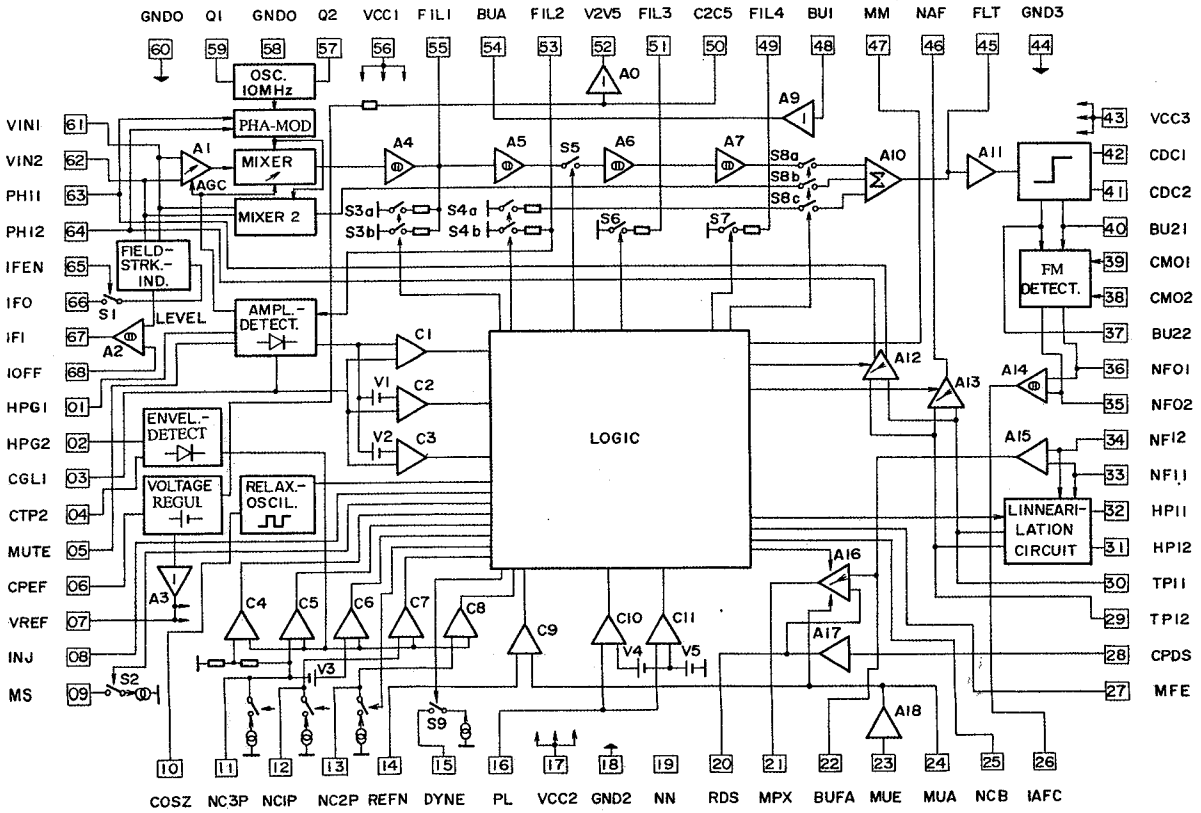
No.	Terminal	Description	No.	Terminal	Description
1	Vcc	Supply voltage for the digital circuit	13	GND	Ground for the analog circuit
2	OSC IN	Resonator input	14	INTEG	Integrating filter terminal
3	OSC OUT	Resonator output	15	BPF ADJ	Adjustment fc of band pass filter
4	GND	Ground for the digital circuit	16	PSK OUT	Biphase signal output
5	TEST1	Test input	17	PSK IN	Biphase decoder input
6	TEST2	Test input	18	LPF SK	Low pass filter for the detection SK
7	OP.CTL	Control input of the operation stop	19	LPF Q	Low pass filter for the crossed detector
8	S/L CTL	Mode control input of the synchonizing detection	20	LPF I	Low pass filter for the synchronizing detector
9	SK OUT	SK detection output	21	DSB IN	DSB demodulator circuit input
10	RDS OUT	RDS synchonizing detection output	22	BPF OUT	Band pass filter output
11	CLOCK OUT	Bit rate clock output	23	BPF IN	Band pass filter input
12	DATA OUT	RDS data output	24	Vcc	Supply voltage for analog circuit

U4290B (FM-IF for DYNAS system)

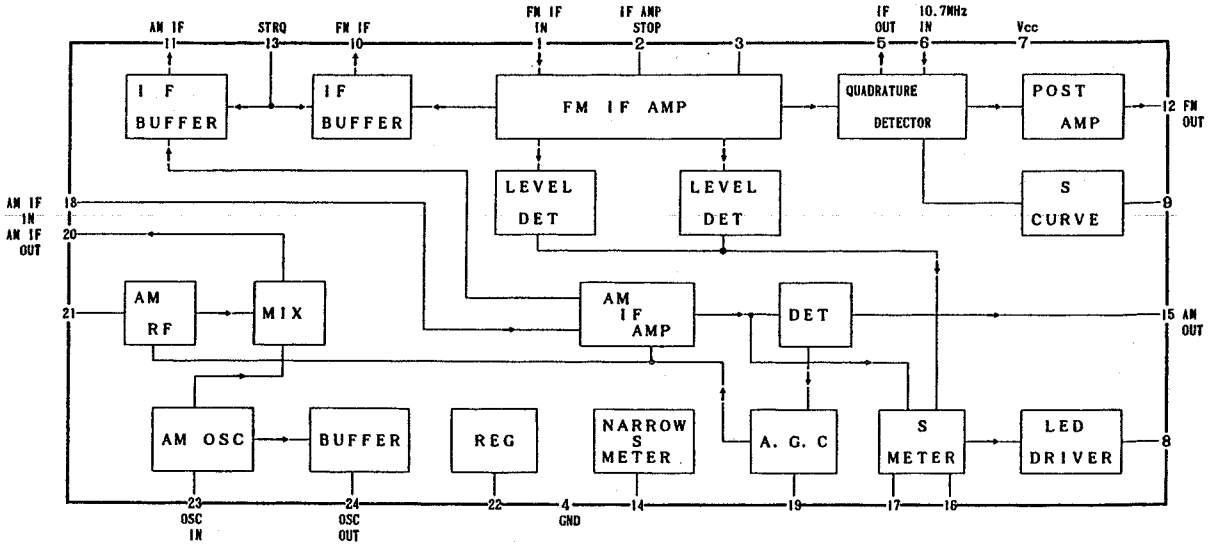
No.	Terminal	Description	No.	Terminal	Description
1	HPG1	Output for the high pass filter of the adjacent channel indicator	27	MFE	Multipath control input - low disables F1 and F2 mode
2	HPG2	Input adjacent channel indicator.	28	CRDS	Input RDS amplifier for high pass filtering
3	CGL1	Time constant for the AGC mixer	29	TP12	Low pass filter for the frequency control
4	CTP2	Rectifier for the adjacent channel indicator	30	TP11	Low pass filter for the frequency control
5	MUTE	Rectifier for muting indication	31	HP12	High pass filter for the frequency control
6	CREF	Noise filter for internal reference at pin 7	32	HP11	High pass filter for the frequency control
7	VREF	Reference voltage 5V	33	NFI1	Input of the AFC network
8	INJ	Injector test pin - do not connect	34	NFI2	Input of the AFC network
9	MS	Forced mono switch if mode NC3 or NC4 is active open collector	35	NFO2	Differential output of the demodulator
		output. Active low.	36	NFO1	Differential output of the demodulator
10	COSZ	Time constant for filter switching	37	BU22	Coupling capacitor for the demodulator
11	NC3P	Threshold adjust for comparator NC3	38	CMO2	Resonant circuit for the demodulator
12	NC1P	Threshold adjust for comparator NC1	39	CMO1	Resonant circuit for the demodulator
13	NC2P	Threshold adjust for comparator NC2	40	BU21	Coupling capacitor for the demodulator
14	REFN	Threshold adjust for comparator of multipath indication	41	CDC2	Offset adjust limiting amplifier
15	DYNE	Currrent output 2 - 5 mA. Indicates Dynas function active	42	CDC1	Offset adjust limiting amplifier
16	PL	Input of the comparator for adjacent channel carry over	43	VCC3	Supply voltage for demodulator and filter circuit
17	VCC2	Supply voltage for logic and audio circuits	44	GND3	Ground for demodulator and filter
18	GND2	Ground for logic and audio circuits	45	FIT	Checking pin filter circuit - do not connect
19	NN	Check pin - do not connect	46	NAF	Tracking voltage for band pass filters
20	RDS	Output of the amplifier for the selected RDS - signal.	47	MM	Low pass filter switch
21	MPX	Output of the muting amplifier for the muted MPX - signal	48	BUI	Input of the buffer for filter tracking
22	BUFA	Output buffer for the unmodified MPX - signal	49	FIL4	Resonant circuit 4
23	MUE	Input of the voltage current converter for muting of the MPX signal	50	C2C5	Low pass filter for AFC
		at low signal of high noise condition	51	FIL3	Resonant circuit 3
24	MUA	Threshold adjust for multipath indication. The impedance controlles the	52	V2V5	Center voltage 2.5 V for filter circuit
		muting deep.	53	FIL2	Resonant circuit 2
25	NCB	Control input (TTL and CMOS compatible),low sets the filter functions	54	BUA	Output buffer for the frequency tracking voltage
		to NCB for search control	55	FIL1	Resonant circuit 1
26	IAFC	For AFC function connect to pin 50. If not used connect pin 7.	56	VCC1	Supply voltage for mixer,oscillator and IF detector
		For tuning control check the current into VREF or VCC/2.	57	Q2	X'tal 10 MHz

No.	Terminal	Description
58	GNDQ	X'tal screening
59	Q1	X'tal 10 MHz
60	GNDQ	Ground for mixer, oscillator and IF detector.
61	VIN1	Input 10.7 MHz
62	VIN2	Center voltage for the input 10.7 MHz
63	PHI1	Low pass phase shifting 10 MHz

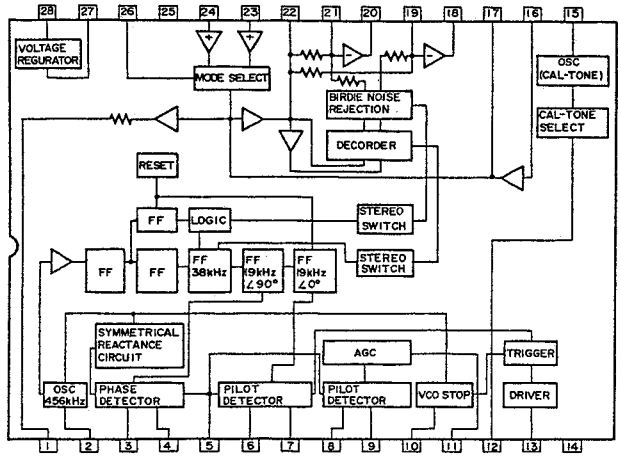
No.	Terminal	Description
64	PHI2	Low pass phase shifting 10 MHz
65	IFEN	Enable input for outputing IF=10.7MHz for startstop counter
66	IFO	Output buffer IF=10.7 MHz
67	IFI	Signal level output
68	IOFF	Current input for adjusting and shifting the signal level output



LA1266A (FM IF & AM radio system)



LA3450 (FM Stereo Decoder)



Terminal No.	Description
1	Composite amp. output
2	OSC 2Vp-p 456kHz
3, 4	Loop filter
5	PLL input
6, 7	Pilot sync. detector filter
8, 9	Pilot sync. detector filter for pilot cancel
10	VCO stop
11	Pilot cancel
12	Cal-tone control
13	Stereo indicator
14	Ground terminal
15	Cal-tone OSC output
16	Cal-tone input
17	Pilot cancel input
18	Post amp. output for left channel
19	Post amp. input for left channel
20	Post amp. output for right channel
21	Post amp. input for right channel
22	Separation adjustment
23	AM input
24	FM input
25	Signal ground
26	AM/FM switch
27	Reference voltage
28	Power supply

ADJUSTMENT PROCEDURES

● Preparation

ANTENNA .....A
RF MODE .....DX
IF BAND .....SUPER NARROW
CABLE .....CABLE indicator lights on
HI-BLEND .....OFF
MODE .....AUTO

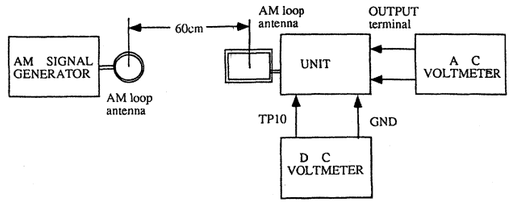
FM mono: 1 kHz, 40 kHz devi.
FM stereo: 1 kHz, L+R 67.5 kHz devi.
Pilot signal 7.5 kHz devi.
AM: 400 Hz, 30 % mod.

FM Section

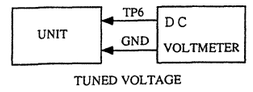
	Item	Step	Connection of instrument	FM SG output	Stereo modulator output	Tuned frequency	Output indicator	Adjustment point	Adjust for	Remarks
1	Tuned Voltage	1	Connect the DC voltmeter to the test point TP-6.			108.00MHz	DC voltmeter	TC005	24.0±0.2V	Repeat the steps 1 and 2 until no further adjustment is necessary.
		2				87.50MHz		L006	4.0±0.1V	
2	Tracking Adjustment	1	Connect the FM SG to the antenna terminal A.	108.00MHz 20dB μ		108.00MHz	AC voltmeter	TC001 to TC004	Maximum output	Repeat the steps 1 and 2 until no further adjustment is necessary.
		2	Connect the AC voltmeter to the test point TP-7.	87.50MHz 20dB μ		87.50MHz		L001to L004 L009	Maximum output	
3	IFT on the Front end		Same as above.	87.50MHz 20dB μ		87.50MHz	AC voltmeter	L005	Maximum output	
4	Muting Center		Connect the DC voltmeter between the test points TP-1 and TP-2.	99.00MHz 80dB μ 30% devi.		99.00MHz	DC voltmeter	L201	0±5mV	IF BAND:SUPER NARROW
5	Muting Level		Connect the oscilloscope to the output terminal.	99.00MHz 14dB μ 30% devi.		99.00MHz	Oscilloscope	R201	Signal output point	
6	PLL Detector		Connect the DC voltmeter to the test point TP-8.	99.00MHz 80dB μ		99.00MHz	DC voltmeter	L253	0±0.1V	IF BAND:WIDE RF MODE:DX
7	MPX		Connect the AC voltmeter to the output terminal of left channel.	99.00MHz 80dB μ Ext. mode	1kHz,67.5kHz devi. R ch.	99.00MHz	AC voltmeter	R402	Minimum	IF BAND:WIDE RF MODE:DX
8	Signal Level			99.00MHz 60dB μ		99.00MHz	7th signal indicator of FL tube	R874	Light on	IF BAND:SUPER NARROW RF MODE:DX
9	RDS		Connect the oscilloscope to the test point TP801.				Oscilloscope	R801	Maximum	Recept the broadcast modulated the data of radio data system.
10	Dynas	1	Add the resistor R152 10Ω							
		2	Connect the test point TP-852 to the ground.	99.00MHz 20dB μ		99.00MHz	AC voltmeter	L851 to L854	Maximum	SG:No modulation
		3	Connect the AC voltmeter to the test point TP851.	99.00MHz 27dB μ			AC voltmeter	L853 clockwise	Same level as above	
		4		99.00MHz 34dB μ			AC voltmeter	L851 counter-clockwise	Same level as above	
		5		99.00MHz 34dB μ			AC voltmeter	L852 L854	Maximum	
		6	After disconnect the short circuit of TP852, remove the resistor R152.							
		7	Connect the distortion analyzer to the output terminal.	99.00MHz 80dB μ		99.00MHz	Distortion analyzer	L856	Minimum	

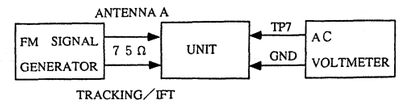
AM Section

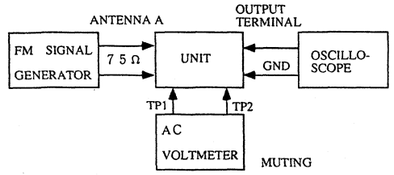
Step	AM SG Output	Tuned Frequency	Output Indicator	Adjustment Point	Adjust for
1	522 kHz 60 dB/m	522 kHz	DC voltmeter	OSC core on L301	1.3±0.1V
2	603 kHz 60 dB/m	603 kHz	AC voltmeter	RF core on L301	Maximum
3	990 kHz 60 dB/m	990 kHz	AC voltmeter	L302	Maximum
4	990 kHz 55 dB/m	990 kHz	4th signal indicator	R301	Light on

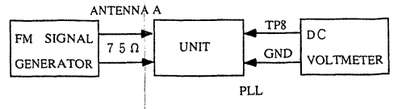


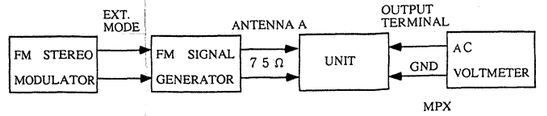
AM Section

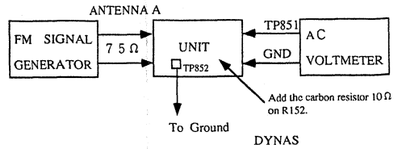


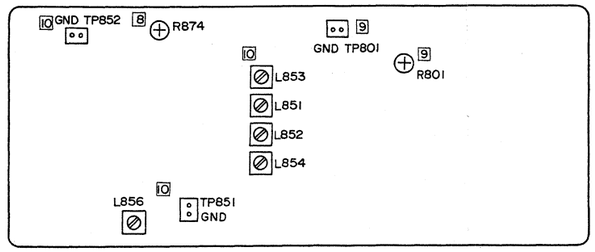




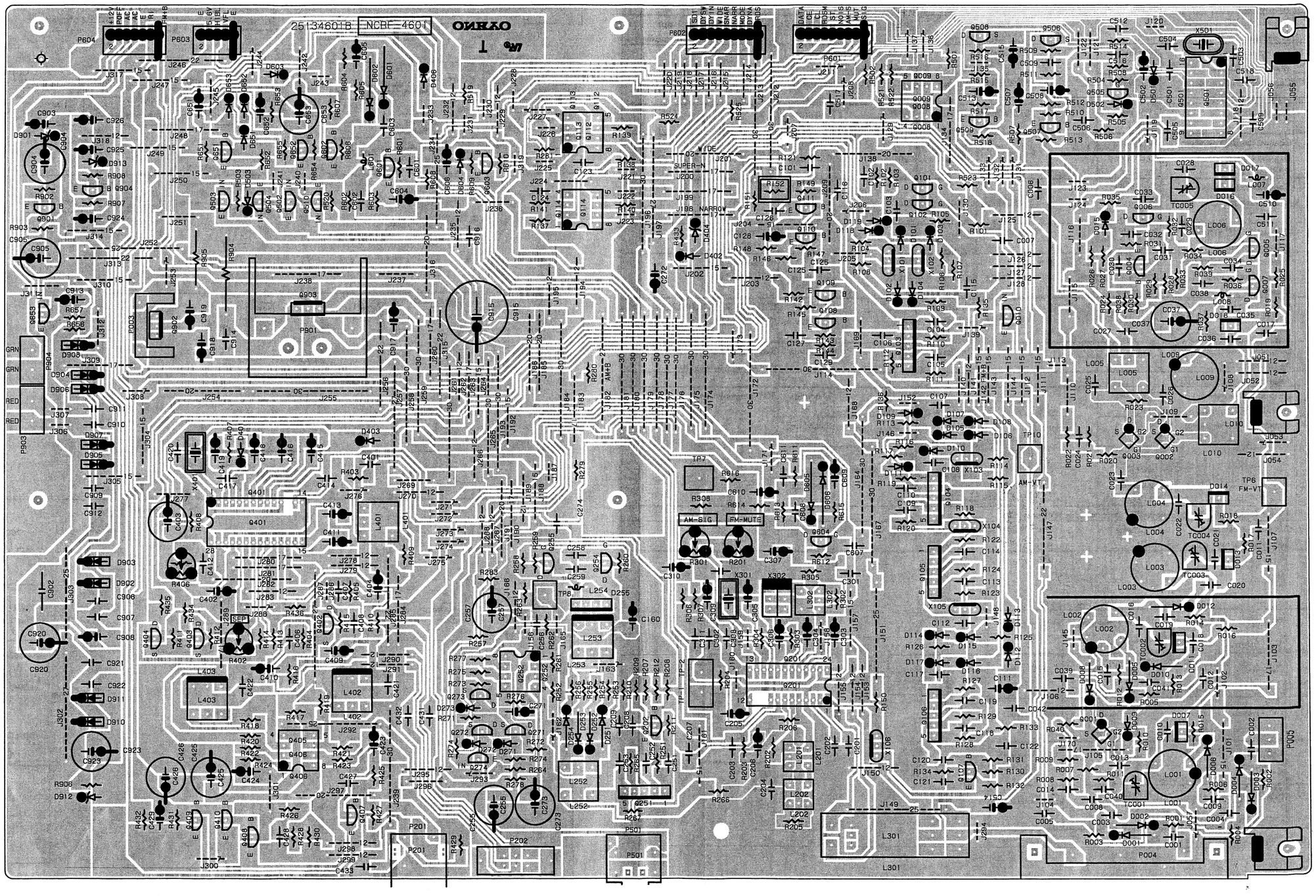








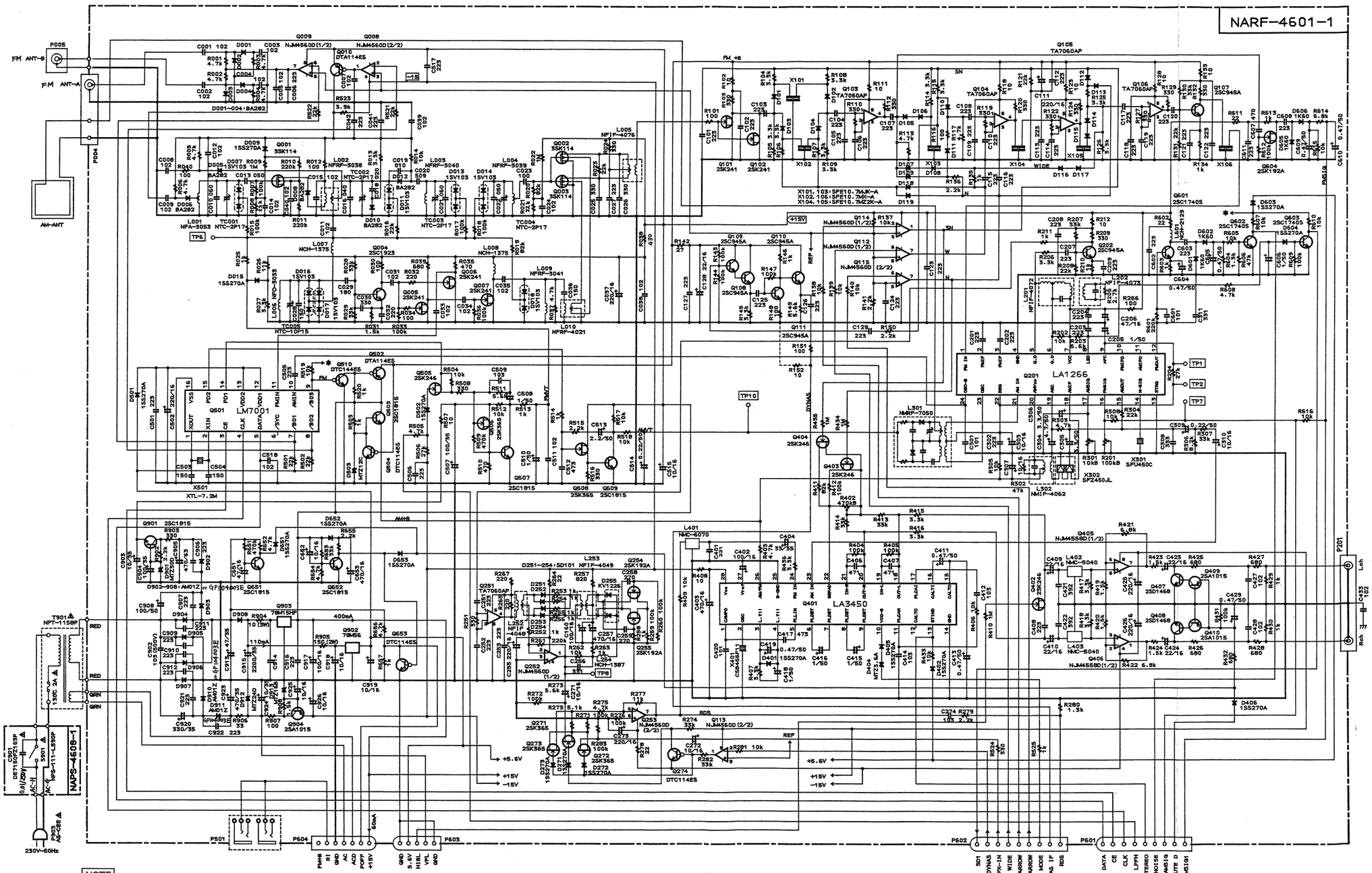
PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE



MAIN CIRUCIT PC BOARD

SCHEMATIC DIAGRAM

NARF-4601-1



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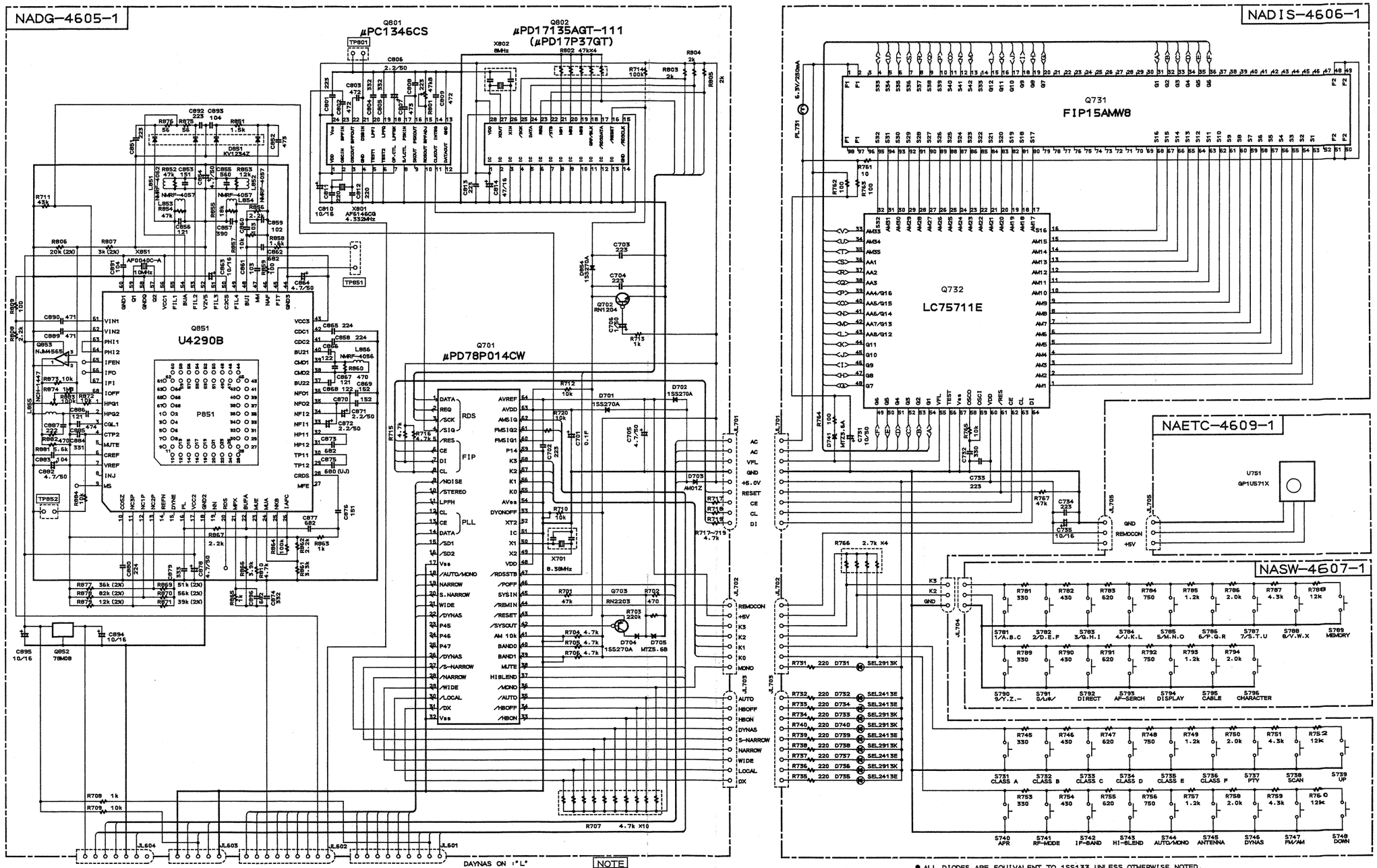
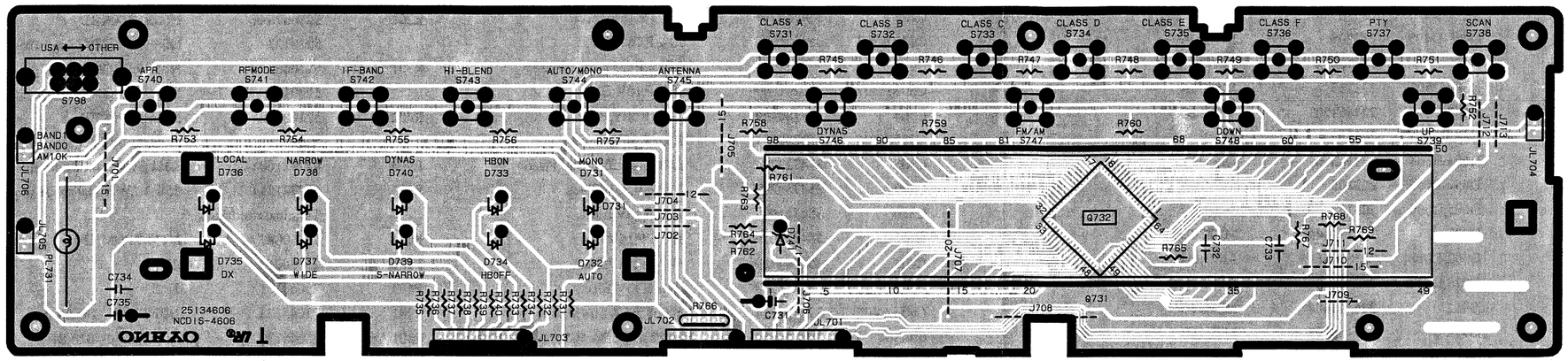
SCHEMATIC DIAGRAM



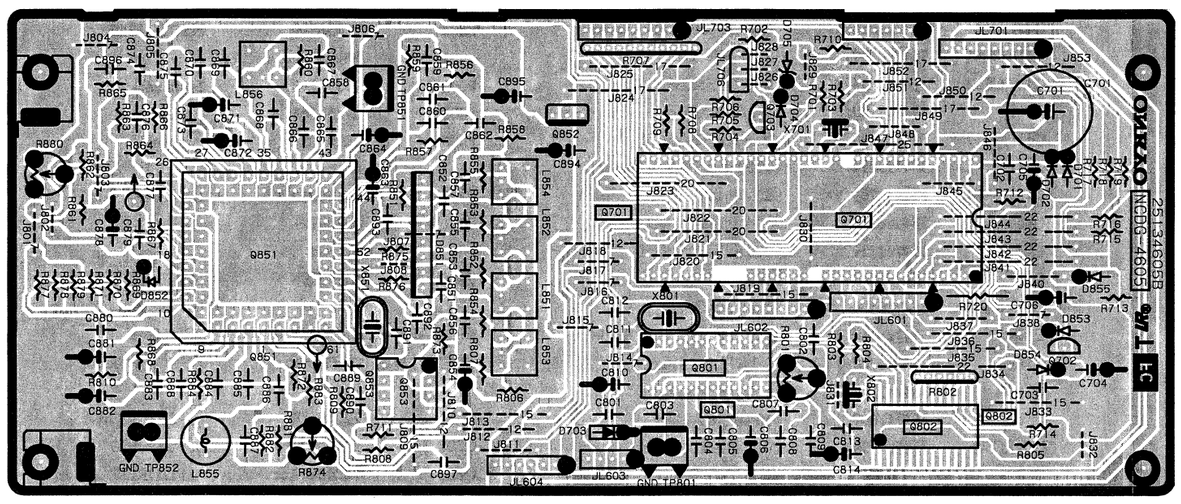
NOTE

- THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
- VOLTAGE (MEASURED WITH VOLTMETER) ⊐ IS DC VOLTAGE. (NO INPUT SIGNAL)
- ALL PNP TRANSISTORS ARE EQUIVALENT TO 2SA1015-GR UNLESS OTHERWISE NOTED.
- ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815-GR UNLESS OTHERWISE NOTED.
- ALL DIODES ARE EQUIVALENT TO 1SS133 UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (-#) ARE IN μF/WV.
- ALL CAPACITORS ARE IN pF/50WV UNLESS OTHERWISE NOTED. EX)030→3pF, 330→33pF, 331→330pF, 333→0.033μF
- ALL RESISTORS ARE IN OHMS 1/4 WATTS UNLESS OTHERWISE NOTED.
- THE THICK LINES IN PC BOARD ARE THE PRINTING SIDE OF THE PARTS. EX) ▪▪▪ PRINTING SIDE
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

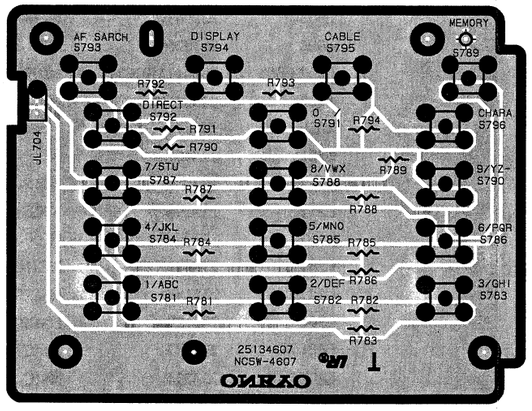
PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE



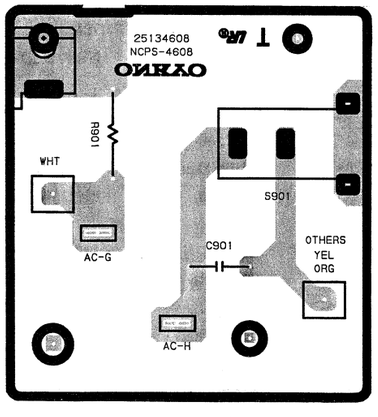
DISPLAY CIRCUIT PC BOARD



DIGITAL CIRCUIT PC BOARD



OPERATION SWITCH PC BOARD



POWR SWITCH PC BOARD

REMOTE CONTROL SENSOR PC BOARD

PRINTED CIRCUIT BOARD PARTS LIST

MAIN CIRCUIT PC BOARD (NARF-4601-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q008,Q009	222579	NJM4560D
Q103-Q106	222407	TA7060AP
Q112-Q115	222579	NJM4560D
Q201	22240039	LA1266
Q251	222407	TA7060AP
Q252,Q253	222570	NJM4560D-X
Q401	22240285	LA3450
Q405,Q406	222502	NJM4558D-X
Q501	22240090	LM7001
Q902	222780565JRC	78M56
Q903	222780155NEC	78M15HF
	Transistors	
Q001-Q003	2212514	3SK114-Y
Q004	2211723	2SC1923-O
Q005-Q007	2212195	2SK241-GR
Q010	2213510	DTA114ES
Q101,Q102	2212195	2SK241-GR
Q107-Q111	2210746	2SC945A-P
Q202	2210746	2SC945A-P
Q254,Q255	2212274	2SK192A-Y
Q271-Q273	2212445	2SK365-GR
Q274	2213290	DTC114ES
Q402-Q404	2211945	2SK246-GR
Q407,Q408	2211705 or 2212794	2SD655-E or 2SD1468-R
Q409,Q410	2211455	2SA1015-GR
Q502	2213510	DTA114ES
Q503,Q507	2211255	2SC1815-GR
Q504,Q510	221282	DTC144ES
Q505	2211945	2SK246-GR
Q506,Q508	2212445	2SK365-GR
Q509	2211255	2SC1815-GR
Q601-Q603	2213284	2SC1740S-R
Q604	2212274	2SK192A-Y
Q651,Q652	2211255	2SC1815-GR
Q653	2213290	DTC114ES
Q901	2211255	2SC1815-GR
Q904	2211455	2SA1015-GR
	Diodes	
D001-D006	223165	BA282
D007,D011	223154	1SV103
D008,D010	223165	BA282
D009,D015	223163 or	1SS133 or
D101-D119	223205	1SS270A
D012	223165	BA282
D013,D014	223154	1SV103
D016-D018	223154	1SV103
D251-D254	223191	SD101
D255	223136	KV1226
D404	224450361	MTZ3.6A
D271-D273	223163 or	1SS133 or
D401-D403	223205	1SS270A
D406	223163 or	1SS133 or
D501,D502	223205	1SS270A
D503	224451203	MTZ12C
D601,D602	223132	1K60
D603,D604	223163 or	1SS133 or
D651-D653	223205	1SS270A
D605,D606	223132	1K60
D901	224453004	MTZ30D
D902-D908	22380046 or	AM01Z or
D910,D911	22380035	GP104003E
D912	224452404	MTZ24D
D913	224451602	MTZ16B
	Coils & Transformers	
L001	233321A	NFA-3053
L002	233322A	NFRF-3038
L003	233324A	NFRF-3040
L004	233323A	NFRF-3039
L005	233441	NFIF-4076
L006	233325A	NFO-3033
L007,L008	233411M022	NCH-1375
L009	233326A	NFRF-3041
L010	233212	NFRF-4021
L201	233401	NFIF-4072
L202	233402	NFIF-4073
L252	233296	NFIF-4048
L253	233297	NFIF-4049
L254	233411K220	NCH-1387
L301	232148	NMRF-7050
L302	232139	NMIF-4062
L401	233383	NMC-6070
L402,L403	233294	NMC-5040
L601	231081	NCH-2129
	Ceramic filters	
X101,X103	3010132	SFE10.7MJK-A
X102,X106	3010041	SFE10.7MX-A
X104,X105	3010130	SFE10.7MZ2K-A
X301	3010076	SFU450C
X302	3010123	SFZ450JL
X401	3010152	CSB456F11
	X'tal	
X501	3010141	XTL-7.2M
	Capacitors	
C037	354742219	220 μ F,16V,Elect.
C111	354742219	220 μ F,16V,Elect.
C128	354742209	22 μ F,16V,Elect.
C160	354741019	100 μ F,16V,Elect.
C205	354780109	1 μ F,50V,Elect.
C206	354744709	47 μ F,16V,Elect.
C255,C273	354742219	220 μ F,16V,Elect.
C257	354744719	470 μ F,16V,Elect.
C271,C272	354741009	10 μ F,16V,Elect.
C274	374721034	0.01 μ F±5%,50V,Plastic
C303,C307	354741009	10 μ F,16V,Elect.
C304	354780479	4.7 μ F,50V,Elect.
C305,C306	354780339	3.3 μ F,50V,Elect.
C308	374723334	0.033 μ F±5%,50V,Plastic
C309	354782299	0.22 μ F,50V,Elect.
C310	354741009	10 μ F,16V,Elect.
C402	354741019	100 μ F,16V,Elect.
C403	354744719	470 μ F,16V,Elect.
C404	354763309	33 μ F,35V,Elect.
C406,C407	374724714	470pF±5%,50V,Plastic
C408	374722234	0.022 μ F±5%,50V,Plastic
C409,C410	354742209	22 μ F,16V,Elect.
C411,C413	354784799	0.47 μ F,50V,Elect.
C412,C414	374721034	0.01 μ F±5%,50V,Plastic
C415,C416	354780109	1 μ F,50V,Elect.
C417,C512	374724734	0.047 μ F±5%,50V,Plastic
C418	354780109	1 μ F,50V,Elect.
C419,C429	354784799	0.47 μ F,50V,Elect.
C421,C422	374723924	3900pF±5%,50V,Plastic
C423,C424	354742209	22 μ F,16V,Elect.
C425,C426	354742219	220 μ F,16V,Elect.
C502	354722219	220 μ F,6.3V,Elect.
C507	354761019	100 μ F,35V,Elect.
C508,C510	354780109	1 μ F,50V,Elect.
C509	374721034	0.01 μ F±5%,50V,Plastic
C513	354780229	2.2 μ F,50V,Elect.
C514	354782299	0.22 μ F,50V,Elect.
C515,C652	354741009	10 μ F,16V,Elect.
C604,C605	354784799	0.47 μ F,50V,Elect.
C606	354780109	1 μ F,50V,Elect.
C609,C610	354784799	0.47 μ F,50V,Elect.
C651	354744709	47 μ F,16V,Elect.
C653	354744719	470 μ F,16V,Elect.
C903	354761009	10 μ F,35V,Elect.
C904	354761019	100 μ F,35V,Elect.
C905	354774719	470 μ F,63V,Elect.
C908	354781019	100 μ F,50V,Elect.
C913	354764709	47 μ F,35V,Elect.
C915	354762229	2200 μ F,35V,Elect.
C917	354741019	100 μ F,16V,Elect.
C918,C919	354741009	10 μ F,16V,Elect.
C920	354763319	330 μ F,35V,Elect.
C923	354764719	470 μ F,35V,Elect.
C924	354761009	10 μ F,35V,Elect.
C925	354741009	10 μ F,16V,Elect.
C926	354741009	10 μ F,16V,Elect.
TC001-TC004	3060020	NTC-2P17,Trimmer
TC005	3060017	NTC-10P15,Trimmer
R201	5210070 or 5210123	N06HR100KBD or N06HR100KBC,Semi-fixed
R301	5210064 or 5210119	N06HR10KBD or N06HR10KBC,Semi-fixed
R402	5210074 or 5210126	N06HR470KBD or N06HR500KBC,Semi-fixed
R904	442821004	10Ω,3W,Metal oxide film
R905	442721514	150Ω,2W,Metal oxide film
	Terminals and Sockets	
P004	25060087	NTM-2PDMN31
P101	25060062	2P-5
P103	25060061	1P-5
P201	25045333	NPJ-2PDBL-185,Output
P501	25045172	HSJ-1003-01-020,RI
P601,P602	25050531	NSCT-9P354
P603	25050527	NSCT-5P350
P604	25050529	NSCT-7P352
	Shield plate and cord	
P002	27150348	Front end
P003	27150349	Front end
P005a	2010102	Antenna
	Radiators	
P903	27160220	RAD51(B)
P901	27160221	RAD74
	Screws	
P902	82143006	3P+6FN(BC),Pan head

DIGITAL CIRCUIT PC BOARD (NADG-4605-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q701	22240688	μ PD78013CW-
Q801	22240679	μ PC1346CS
Q802	22240689 or 22240639A	μ PD17P137AGT or μ PD17135AGT-112
Q851	22240641	U4290B
Q852	222780085MIT	78M08L
Q853	22240191	NJM4565D-D
	Transistors	
Q702	221282 or 2213560	DTC144ES or RN1204
Q703	2212600 or 2213580	DTA124ES or RN2203
	Diodes	
D701,D702	223205	1SS270A
D703	22380046	AM01Z
D704	223205	1SS270A
D705	224450562	MTZ5.6B
D851	225282	KV1234Z
D854	223205	1SS270A

CIRCUIT NO.	PART NO.	DESCRIPTION
	Resonators	
X701	3010205	CST8.38MTW,Ceramic
X801	3010203	AF6146CG,X'tal
X802	3010190	CST8.00MTW,Ceramic
X851	3010204	AF0040C-A,X'tal
	Coils	
L851	232158	NMRF-4062
L852-L854	232156	NMRF-4057
L855	232157	NCH-1447
L856	232155	NMRF-4056
	Capacitors	
C701	3000057	0.1F,5.5V,Super
C705	393380477	4.7μF,50V,Elect.
C706	393380107	1μF,50V,Elect.
C802,C803	374724724	4700pF±5%,50V,Plastic
C804,C805	374723324	3300pF±5%,50V,Plastic
C806	393380227	2.2μF,50V,Elect.
C807,C852	374724734	0.047μF±5%,50V,Plastic
C808,C851	374722234	0.022μF±5%,50V,Plastic
C809	374724724	4700pF±5%,50V,Plastic
C810,C863	393341007	10μF,16V,Elect.
C814	393344707	47μF,16V,Elect.
C853,C876	373301514	150pF±5%,125V,PP
C854,C864	393380477	4.7μF,50V,Elect.
C856,C867	373301214	120pF±5%,125V,PP
C858,C865	374722244	0.22μF±5%,50V,Plastic
C859	374721024	1000pF±5%,50V,Plastic
C860,C861	374721034	0.01μF±5%,50V,Plastic
C862,C873	374726824	6800pF±5%,50V,Plastic
C866,C868	372121224	1200pF±5%,50V,Styrole
C869,C870	374721524	1500pF±5%,50V,Plastic
C871,C872	393380227	2.2μF,50V,Elect.
C874	374723324	3300pF±5%,50V,Plastic
C877,C896	374726824	6800pF±5%,50V,Plastic
C878,C882	393380477	4.7μF,50V,Elect.
C879	374723334	0.033μF±5%,50V,Plastic
C880	374722244	0.22μF±5%,50V,Plastic
C883	374721044	0.1μF±5%,50V,Plastic
C884	373303314	330pF±5%,125V,PP
C885	374724744	0.47μF±5%,50V,Plastic
C886	373301214	120pF±5%,125V,PP
C887	374722224	2200pF±5%,50V,Plastic
C889,C890	373304714	470pF±5%,125V,PP
C891,C893	374721044	0.1μF±5%,50V,Plastic
C892	374722234	0.022μF±5%,50V,Plastic
C894,C895	393341007	10μF,16V,Elect.
	Resistors	
R707	49163472410	4.7k×10,1/10W,Array
R801	5210068	N06HR47KBD,Semi-fixed
R802	49163473405	4.7k×5,1/10W,Array
R874	5210076	N06HR100KBD,Semi-fixed

CIRCUIT NO.	PART NO.	DESCRIPTION
	Plugs & Sockets	
P701	25050400	NSCT-46P227,IC
P851	25050900	NSCT-68P695,IC
TP801	25055038	NPLG-2P29
TP851,TP852	25055038	NPLG-2P29

DISPLAY CIRCUIT PC BOARD (NADIS-4606-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	FL tube	
Q731	212118A	FIP15AMW8
	IC	
Q732	22240642	LC75711E
	Lamp	
PL731	210064B	PL6.3V 250mA
	Diodes	
D731,D733	225142	SEL2913K
D732	225137CG or	SEL2413E-CG or
D734,D735	225137DG	SEL2413E-DG
D736,D738	225142	SEL2913K
D737,D739	225137CG or	SEL2413E-CG or
	225137DG	SEL2413E-DG
D740	225142	SEL2913K
D741	224450361	MTZ3.6A
	Capacitors	
C731	393381007	10μF,50V,Elect.
C735	393341007	10μF,16V,Elect.
	Resistor	
R766	49163272404	2.7k×4,1/10W,Array
	Switches	
S731-S748	25035548	NPS-111-S510
	Holder	
	27190845A	LED10

OPERATION SWITCH PC BOARD(NASW-4607-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
S781-S796	25035548	NPS-111-S510,Push switches

POWER SWITCH PC BOARD (NAPS-4608-1)

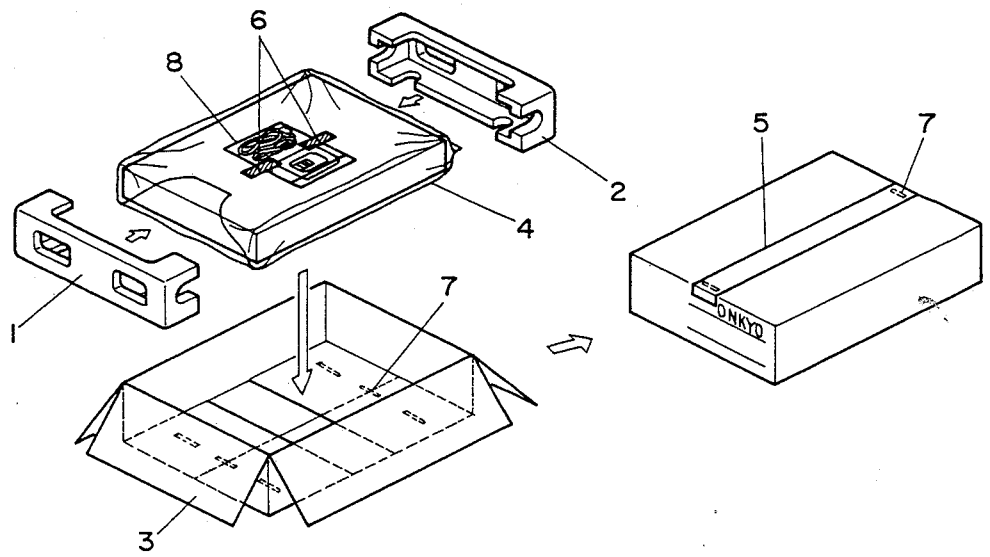
CIRCUIT NO.	PART NO.	DESCRIPTION
C901	3500065A	⚠ 0.01μF,AC400/125V,IS capacitor
S901	25035636	⚠ NPS-111-L590P,Power switch

REMOTE SENSOR PC BOARD(NAETC-4609-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
U751	24130007	GP1U571X

NOTE: THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION
1	29091495	Pad L
2	29091496	Pad R
3	29052514A	Master carton box <B>
	29052516A	Master carton box <S>
4	29100037A	650×500,Styrene bag
5	29110071	Damplon tape
6	261504	Adhesive tape
7	282301	Sealing hook
8	Accessary bag ass'y	
	29341778	Instruction manual
	29100097	350×250,Styrene bag
	25065462	YAE21-0237,Two FM adaptors
	292112	FM antenna
	232140	NMA-3057,AM loop antenna
	2010098A	Connection cord
	2010200	Connection cord RI
	29365024A	Warranty card <F>
	29100107	Styrene bag for warranty card <F>
	24140248	RC-248T,Remote control transmitter
	3010054	UM-3,Two batteries

NOTE: <B>:Black Model only
<S>:Silver Model only
<F>:French Model only

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